

APOLLO 8 MISSION COMMENTARY,12/23/68,GET 583700,CST 5:28 P,174/1

PAO This is Apollo Control at 58 hours 37 minutes.
At the present time, our spacecraft velocity is 4037 feet per
second and we are at an altitude now of 26 764 nautical miles
above the Moon. We had one rather brief conversation with
Bill Anders in the past 15 minutes or so and have not heard
from the spacecraft since. During that conversation, we
passed up to the spacecraft an update to the computer
driven clock aboard the spacecraft and that pretty much
summarized the content of that communication. We'll play
that back for you now and then pick up live with conversations
that are going on at the present time.

SC Go ahead, Houston.

CAPCOM Okay, Apollo 8, we'd like to update your
CMC clocks. This is not the correct errors which we have
now but just to make up for some effects that we're going
to have in lunar orbit. And what we'd like to have you do
is go to P00 and accept and let us update the clock time.

SC Stand by.

SC Okay, in P00 and accept.

CAPCOM Rog, thank you.

CAPCOM Apollo 8, Houston.

SC SC Go ahead, Houston.

CAPCOM Okay, we're completed with the clock update
and the computer is yours.

SC Thank you. Going to block.

CAPCOM Rog.

END OF TAPE

APOLLO 8 MISSION COMMENTARY,12/23/68,GET 592200,CST 6:13, 175/1

PAO This is Apollo Control at 59 hours 22 minutes into the flight. At the present time Apollo 8 is at an altitude of 25 036 nautical miles above the moon and traveling at a speed of 4053 feet per second. Since our last report, we have only had one very brief conversation with the spacecraft. That was a request from the ground that Bill Anders begin a fuel cell purge, supposedly one of the routine bits of housekeeping that the crew will - is carrying out throughout the flight, at specified time intervals and part of this procedure to remove any contaminants that build up inside the fuel cells and could begin to degrade their performance. We will play back the short bit of tape that we have on that conversation and then stand by for any possible call to the crew.

| | |
|--------|------------------------|
| CAPCOM | Apollo 8, Houston. |
| SC | Go ahead Houston. |
| CAPCOM | How about an 02 purge. |
| SC | Okay. |
| CAPCOM | Thank you. |
| SC | There's number 1. |
| CAPCOM | Roger. |

END OF TAPE.

PAO This is Apollo Control at 59 hours 46 minutes. Capsule Communicator Ken Mattingly has just put a call into the crew. We'll catch up with the tape and then follow the conversation live.

CAPCOM Apollo 8, Houston.

SC Houston, Apollo 8, go ahead.

CAPCOM Okay, we'd like to update CMC the order that we'll update will be the LM state vector, the CSM state vector, and then the external DELTA-V and the rest mat. So any time you're free with it, we can have P00 in accept we'll go ahead with it.

SC I understand you're going to update LM state vector, CSM state vector, and external DELTA-V and rest mat.

CAPCOM Affirmative. And I'll have one, two, three pass to read to you.

SC Stand by. Okay, you've got P00 in accept.

CAPCOM Okay, thank you. And just a minute I'll be with you on the pass. They'll be three minute pass. One of them MCC 4.

SC Houston, Apollo 8, we're ready to copy if you read.

CAPCOM Okay, stand by.

SC Okay, that means we've lost com here for a second.

CAPCOM No, just fine. 012 minus 00 011 plus 00 012 031 008 323 November-Alpha plus 00 618 00 020 011 00 020 17 29 65 308 Alpha-Centauri up 073 left 34. For the stars it will be the primary-Sirius, secondary Rigel, 129, 155 010, over.

SC Roger, MCC4, RCS G&N 6288 NA NA 060 59 5430 minus 00012 minus 00011 plus 00012 031 008 323 NA, are you with me so far?

CAPCOM Keep going.

SC Plus 00618 00020 011 00020 17 29 65 308 Alpha-Centauri, up 073 left 34 primary Sirius secondary Rigel 129 155 010, over.

CAPCOM That's correct Apollo 8.

SC And what else have you got?

CAPCOM Okay, I've got one for pericyynthion plus 2 and it's a minimum DELTA-V solution.

SC Roger, ready to copy.

CAPCOM Okay, that's pericynthion plus 2 RCS G&N 628 71 November-Alpha and stand by one. Okay, we'll pick up with a pitch trim and yaw trim of not applicable. Time 071 07 2216 minus 004 68 plus 00 254 plus 00 181 173 101 027

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November-Alpha plus 00 187 00 563 515 005 63 01 31 69 198
044 down 044 left 45 plus 11 00 minus 025 00 129 67 36198
137 0153 primary Sirius secondary Rigel 129 155 010
4 jets plus X. This assumes execution of midcourse correction
number 4 and uses the same alignment as midcourse correction 4,
over.

SC Roger, pericyynthion plus 2 minimum DELTA-V
RCS G&N 62871 NA NA 071 07 2216 minus 00468 plus 00254 plus 00181
173 101 027 NA plus 00187 00 563 515 00563 013169 198 044
down 044 left 45 plus 1100 minus

END OF TAPE

SPACECRAFT Graft 45 plus 1100 minus 02500 12 niner 67 361 niner 8 1370153 primary Sierra, secondary rogel 12 niner 155010 4 jet plus 6 assumes MCC4 with same alignement over.

CAPCOM That is correct Apollo 8.

SPACECRAFT Houston, Apollo 8, confirm that foresite star and SPA are exactly the same number and not typographical error.

CAPCOM Roger, Apollo 8, they are checking that. Apollo 8, the computer is here if you can take it back

SPACECRAFT Roger, going to Block.

CAPCOM Thank you.

CAPCOM Apollo 8, Houston here. Apollo 8, Houston

SPACECRAFT Houston, this is Apollo 8. Do you copy?

CAPCOM I do now loud and clear. I've got one more pad for you and the confirmation that forsite star number and the pitch angle are correct at 44.

CAPCOM Roger, and we are ready to do our P52 preferred alinement at this time are you ready?

CAPCOM Affirmative.

SPACECRAFT Okay, we are ready to copy.

CAPCOM Okay this is a pericentium plus 2 for a fast return. This will be SPS GNN 628 71 minus 161 plus 12 niner 071 064207 plus 45224 minus 06216 minus 18712 001 287351 November Alfa plus 001874 niner 336 6034 niner 118 112038 2 niner 6 earth up 010 right 37 plus 14 75 plus 06500 1323 niner 36 niner 131060 niner 23 primary star Sirius secondary Rigel 12 niner 155010 no ullage. Assumes execution of midcourse correction 4 and uses the same alignement. The time for MCC5 for GERU determination that's Golf Echo Romeo Uniform. This will be a GET of 8302 us P37 NC4 steps 1 through 10 and NC8 steps 3 and 4. I say again use P37 November Charlie 4 steps 1 through 10 and November Charlie 8 steps 3 and 4. Velocity 400 K for Carter control chart 36507 over

SPACECRAFT Houston, Roger, this is Apollo 8, you copy?

CAPCOM This is Houston

SPACECRAFT Roger Houston, this is Apollo now you read.

CAPCOM Okay, loud and clear Bill.

SPACECRAFT Okay, Ken, pericentium plus 2 fast return SPS GNN 62871 minus 161 plus 12 niner 071064207 plus 45224 minus 06216 minus 18712 001 287 351 NA plus 00187 49336

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/23/68, GET 600600, CST 6:57p, 178/1

SC 49336 603 4 niner 118 11 2038 2 niner 6
Earth up, 010 right 37 plus 1475 plus 06400 1323 niner 36
niner 13 1060 niner 23 primary serious secondary roger 12 niner
155 010 no ullage assume MCZ4 same alignment MCZ5 gay rude
determination GED 8302 P-37 MZ4 1 through 10 and copy MZ 8
3 and 4. Velocity at 400K 36507. Over.

CAPCOM Okay, Apollo 8. That's correct with one
exception. In the pad format under longitude noun 61. That
is plus 06500. Over.

SC Roger, that's what I have - plus 06500.

CAPCOM Okay. That's correct Apollo 8.

SC And we're ready to copy whatever else
you have.

CAPCOM Apollo 8, let's go back and confirm on
your minimum Delta V pericyynthion plus 2. That the pitch
column is 101. That's the fifth block down.

SC Roger. Pitch. Roger, Pitch 101.

CAPCOM Okay. Thank you very much. And the item
we have left to go is that we'd like to get with you on how
you want to handle problem with windows on rev 2.

SC Okay, Houston. Stand by on that please.

CAPCOM Roger.

SC Houston, this is Apollo 8. We want you
to come up with a suggested red line for RCS usage during
Lunar orbit, also, please.

CAPCOM Rog, that's in work.

SC And for your information, Houston, when
the Sun is shining on window 5, it's pretty hazy. Window
number 1 is a little bit better.

CAPCOM Okay, thank you.

SC Houston, this is Apollo 8. Houston,
Apollo 8.

CAPCOM Apollo 8, go ahead.

SC Roger. We tried to get this realignment.
We need - Do you have a maneuver to get us some gimbal angles
so we don't get gimbalized when we get the preferred alignment?

CAPCOM Stand by on that.

SC Thank you.

SC All right here's the present position
we'll go into gimbal lock because we're doing it in preferred
angle.

CAPCOM Say it again, Apollo 8.

SC In running through program 52, we get a
program alarm 401 which would indicate there'd be continued
if we drive it into gimbal lock.

CAPCOM Rog. I understand.

CAPCOM Apollo 8, Houston. This should be an
option 1 like option 3.

SC Rog Houston, we're doing an option 1

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SC like option 3. We keep getting a 401
alarm, which does desired RCTU yield gimbal lock.
CAPCOM Rog. Stand by.

END OF TAPE.

APOLLO 8 MISSION COMMENTARY, 12/23/68, GET 601600, CST 7:07 179/1

CAP COM Apollo 8, Houston. It appears that you have maneuvered around the Gimbal LOX system.

SC Roger. Roger.

CAP COM Okay. Sorry we were late on that answer.

SC Thank you. Houston.

PAO This is Apollo Control. During that series of conversations with the spacecraft, among the numbers passed up to the crew and then verified and read back down from the spacecraft, was the information that will be used for the midcourse correction coming up at 61 hours. That maneuver is scheduled to be an RCS maneuver using the 4 reaction control system jets on the service module, each of those having a thrust of about 100 pounds. So we'd have a total of 400 pounds of thrust. The burn duration is scheduled for 11 seconds and with that much burn time and that much thrust acting on the weight of the vehicle which is estimated to be at 62 888 pounds it gives a delta V, a change in velocity, of about 2 feet per second. And that velocity change would be in the retrograde direction. It would slow the spacecraft down slightly, having the effect of lowering the perigee or perilune at the point the spacecraft passes closest to the moon. Our computations on the ground give the low point above the surface of the moon at present, without the maneuver, as 69 nautical miles. The nominal altitude would be 61.5, and this burn is designed to give us that altitude at pericyynthion. The spacecraft will be pitched down and yawed right slightly in the burn, making it retrograde and slightly out of grade. We're now back in conversation with the spacecraft, and we'll pick that conversation up now.

SC Houston, Apollo 8.

CAP COM Go ahead.

SC Well, we stopped and went through course line of P52 and then we got final line, pick a pair, pick Capella. But she drove and didn't get to any place. All right, just pick Capella, I can't recognize anything out there right now. Can I re-cycle here and go back and pick a pair?

CAP COM I'm sorry, Apollo 8.

SC All right, Houston? Apollo 8.

CAP COM Go ahead, Apollo 8.

SC Our plan is to go back into re-enter program 52. It did not drive to Capella and I can't recognize it in the scanning telescope.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/23/68, GET 602600, CST 7:17p, 180/1

SC My plan is to go back into re-enter program 52, well it did not drive to cabilla and I can't recognize it in the scary telescope. My plan is to go back into the recoil P-52.

CAPCOM Okay, stand by one.

CAPCOM Apollo 8, can you confirm that you zero the optics where I'm concerned?

SC Roger that's affirmative, we zeroed the objects.

CAPCOM Apollo 8 Houston, you have a go for a second try in P-52 in option 3.

SC Okay. I know how (garble) got in the telescope, I might want to call that one instead of Capella.

CAPCOM Okay.

SC I want to see what it comes up with first, though.

PAO This is Apollo Control. We have just now passed the 30-minute mark in the clock counting down to the mid-course correction maneuver. Now that clock currently reading 28 minutes 35 seconds until the burn, and at the present time Apollo 8 is at an altitude of 22 211 nautical miles above the Moon, traveling at a speed of 4085 feet per second. We'll continue to stand by for any conversation from the spacecraft or the ground to the spacecraft.

SC Houston, Apollo 8. We came up with an unacceptable difference in our stars. We're going to have to recycle.

CAPCOM Roger.

SC If we don't get this mid-course, then what will I do to our pericyynthion?

CAPCOM Stand by, one.

CAPCOM Apollo 8, Houston. In the event that we don't get this mid-course in, we'll still go for an LOI, and let's don't forget that you try a (garble) which is OCTO 10.

SC That's the one we're trying now.

CAPCOM Roger.

END OF TAPE.

APOLLO 8 MISSION COMMENTARY, 12/23/68, GET 603600, CST 7:27 181/1

PAO This is Apollo Control at 60 hours 40 minutes into the flight, and we're continuing to countdown to our midcourse correction now 19 minutes 57 seconds from that maneuver. At the present time the crew is somewhat behind in the flight plan, and we suspect they are involved in aligning the inertial measurement unit in the Guidance and Navigation equipment. We just heard from the Guidance Officer that it appeared that that operation was proceeding well at this time. We'll continue to follow activities and monitor for any conversation between the ground and the spacecraft.

PAO This is Apollo Control at 60 hours 46 minutes. Now we're continuing to monitor for conversations between the ground and spacecraft. It's been a very quiet period what with the crew busily involved in getting ready for the midcourse correction maneuver. That burn is scheduled to occur now in 14 minutes and to resummairize that will be using the spacecraft Reaction Control System thrusters. It will be an 11 second burn giving us a change of velocity of 2 feet per second. That velocity change will primarily be retrograde slowing the spacecraft down by about 2 feet per second in order to lower the pericyynthion or point at which the spacecraft passes closest to the Moon. And the burn will also be performed with the spacecraft yawed slightly out of plane. At 60 hours 47 minutes this is Apollo Control.

END OF TAPE

10/19/68 ✓

APOLLO MISSION COMMENTARY, 12/23/68, GET 605400 CST 7:45 p 182/1

PAO This is Apollo Control at 60 hours 54 minutes we just heard from the spacecraft. Jim Lovell advised that they are set and apparently ready to go at this time for their midcourse correction maneuver. We will play back that conversation for you and then stand by for further communications with the spacecraft.

SC Houston, Apollo 8.

CAPCOM Go ahead.

SC We are all set up counting down at 8 minutes.

CAPCOM Roger.

CAPCOM Apollo 8. Our data is down right now, appreciate you making sure you have the tape recorder on.

SC Roger. I am going to go -- I'll have to go COMMAND reset. You've got control.

SC Houston, Apollo 8.

CAPCOM Go ahead.

SC Roger. You have some pitch and yaw angles for our PGC after burn.

CAPCOM Okay Apollo 8. That's pitch 348 yaw 315.

SC Pitch 348, yaw 315.

CAPCOM That's affirmative. Hey, would you give us another hack on your count down time?

SC It's 518 17 16 15 14.

CAPCOM Thank you.

SC Houston, I will give you a mark in 4 minutes.

CAPCOM All right. Thank you.

SC 3 2 1 mark. Four minutes.

PAO We are coming up now on 3 minutes until our midcourse correction maneuver. You will note a slight time delay, from the time when the spacecraft is counting back and we're watching our clocks here. That's about one and one half second delay one way. Here is another call to the crew.

CAPCOM Apollo 8, Houston. How about switching the biased switch over to the left.

SC Roger. 3 2 1 mark switch.

PAO Coming up on 2 minutes now. Still looking good for that maneuver. At the present time, the spacecraft is at an altitude of 21 thousand 144 nautical miles above the moon and traveling at a speed of 4100 feet per second. We're now coming up on 1 minute 30 seconds until that midcourse correction maneuver. This is Apollo Control at 60 hours 59 minutes 41 seconds, and we're counting down now the last 10 seconds to our maneuver. We should have the beginning of that 11 second reaction control system maneuver at this time. We will stand by for confirmation here on the ground. We show the burn completed at this time.

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We should have some preliminary figures shortly. Power Guidance and Control Officer advises that they clocked the burn at about 12 seconds. We nominally planned it for about 11. That would be a one second differential.

SC Houston, Apollo 8.

CAPCOM Go ahead.

SC Roger. Burn on time, angles nominal, burn time about 12 seconds, .2 feet per second after the Delta-VC, 0 in VGX. We have transferred the results of the burn over to the left slot VERB 66.

CAPCOM Roger. I have a couple of items that I would like to clean up. We will get you an RCS budget. We've got one deadline now we are trying to get some firmer numbers for you, and we will have those in a little bit. But now your PTC usage is right on the flight plan line, so everything looks pretty good there. We want to get a crew status report from you. We would like to firm up the rev 2 flight plan idea, and sometime at your convenience we would like to take a reading of the PRD for the Commander and CMP and then have you swap them. We are trying to isolate the -- what the possible reason is for the discrepancy, or the disparity in the two readings.

SC And we are maneuvering to the PTV attitude, Houston.

CAPCOM Roger.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/23/68, GET 610400, CST 7:55 183/1

CAP COM Apollo 8, Houston. Could you give us the sign of that Z residual?

SC Stand by Houston. All right, Houston, looks like we didn't record just the Z. We recorded delta VC, which is minus 0.2.

CAP COM Okay, understand.

SC Delta V was 0.1 but we didn't get the sign.

CAP COM Roger. Understand that was delta VC was minus 0.2. I copied delta VZ. ZULU is 0.2. Is that incorrect?

SC Roger. It was 0.1 but we did the sign.

CAP COM Okay. Thank you.

SC We can get it. We have it on the tape, Houston, whenever you want to dump it.

CAP COM Rog. Thank you.

SC Give you about the last 5 minutes worth.

CAP COM Roger.

SC Okay, Houston, for the PRD's.

CRD is .07. CMP is .64. LMP is .80. Note that the CMP's haven't changed since we started and the commander's haven't changed much. We have swapped PRD's, commander has LMP, CMP has commanders and LMP has CMP's PRD. Over.

CAP COM Okay. Thank you.

PAO This is Apollo Control. Based on this information passed back from the crew on that midcourse correction and our figures here on the ground, it appears that the maneuver was within about 0.2 of a foot per second of being right on the nominal and that would put us very close to the preplanned pericynthion of 61-1/2 nautical miles. We, of course, will be tracking the spacecraft following this maneuver to determine just exactly what effect it did have. But that was the preplanned. That maneuver would have had the effect of lowering the pericynthion by about 6 or 7 nautical miles. At 61 hours 10 minutes into the flight, Apollo 8 is currently at an altitude of 28 676 nautical miles and traveling at a speed of 4107 feet per second. This is Apollo Control, Houston.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/23/68, GET 612900, CST 8:20 184/1

PAO This is Apollo Control at 61 hours 29 minutes. A preliminary figure on the effects of that midcourse correction performed at 61 hours indicates that our height of perigee will be 62.3 nautical miles as a result of that maneuver. Now we have been shooting for something on the order of 61.5. 62.3 is very good, and the flight controllers here in Mission Control Center are quite happy with that figure. The spacecraft also computed height of pericyynthion following the maneuver and we heard from Lovell their onboard computation was that the maneuver would of placed their pericythion at 63 nautical miles. So we have very close agreement between the ground computer figure in that case and the onboard computation. We'll playback that conversation with the spacecraft for you now and then stand by for any communications that should develop afterwards.

SC Houston, Apollo 8.

CAPCOM Go ahead.

SC Roger, understand as follows water, the Commander has about 50 clicks so far today; CMP 43, and the LMP is 44. We've eaten two meals so far today. Today meal A and B; took most of it except for the hard hard bite. No one cares for it. Pudding was outstanding. We're at a gain of pericynthion now of plus 63 miles. Commander and CMP have had a rest period just before the midcourse four of about 2 hours.

CAPCOM Roger.

SC Houston, Apollo 8.

CAPCOM Go ahead.

SC We're at a gain of about 20 500 miles from the Moon at 61 14, how does that agree with what you figure?

CAPCOM Apollo 8, Houston. Looks like your on the secondary loop. We would like to run that for about 5 minutes.

SC Roger. We're doing the EGS redundant component check.

CAPCOM Roger, we'll follow.

SC - data down there Houston, guess you are. Okay, see you stopped my tape then. I've been running for about 3 extra minutes here to record the check.

CAPCOM Roger, we have data now. That was a temporary loss.

SC What's the matter was it chow time down there?

CAPCOM Roger. Didn't know you could smell it that far away.

SC Give me a call when your satisfied with the secondary loop it's stabilized at down here pretty well

CAPCOM Wilco, and you might tell Jim that RTCC is about 4 miles off. We had a 20 496.

SC Fine. Just put compressor Q on ACQ. Houston, Apollo 8, do you show battery B as voltage dropped as not from the post charge value over.

CAPCOM Apollo 8, Houston, confirm that battery B is a little bit lower, and this is attributed to the parasitic loads that are on there.

SC Okay, I just didn't see the same kind of drop for A. So if you think it's okay, it's fine.

CAPCOM That's firm. You don't have the same parasite loads on that. B is actually drawing some.

SC Okay, I guess that's the radiators, uh.

CAPCOM Apollo 8, Houston, we see enough of the secondary evaporator. We would like for you to wait about 2 minutes between the time you go to reset and the time you turn the pump on.

SC I agree, good idea. And we plan to leave the water control in auto.

CAPCOM Roger. Apollo 8, Houston.

SC Go ahead Houston, Apollo 8.

CAPCOM Okay, looking over the - our redundant component check, it appears we have not yet checked the integrity of the secondary loop radiators, and if you haven't done that some time we would like to open up the secondary radiators but not flow through and just measure the accumulator pressure.

SC Standby. Houston, we don't show that in our pre OLI check, but we will go ahead and do it if you want to.

CAPCOM Roger, we just noticed that it isn't there, and yes we would like to. You understand that we are not proposing that you flow, but merely we check out for any pressure indication.

SC Roger, wait till I get my trusty assistant here to help me. Okay, Houston, we're going to blow the secondary, I mean open the secondary rad for 30 seconds now.

CAPCOM Roger.

SC Looks pretty good.

CAPCOM Sure does.

SC Okay, they're closed now.

CAPCOM Okay, thank you, looks good.

SC Roger, no meteroids yet.

PAO This is Apollo Control. During that conversation with the crew, Jim Lovell gave us a status report on the eating and drinking and sleeping that they've done recently. And he said that they have logged 50 clicks of

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water for the Commander, and 33 clicks for the Command Module Pilot, and 44 clicks for the Lunar Module Pilot. That translates into one half ounce per click which would be about 25 ounces for the Commander; about 21 or 22 ounces for the Command Module Pilot and about the same amount of water for the Lunar Module Pilot. Lovell noted that they have all had two meals today. And found the pudding particularly palatable to them, and also you heard Lovell relay the onboard figure for the height pericythion, the closest approach of the spacecraft to the Moon following that midcourse correction maneuver. We'll continue to monitor for any conversations with the crew, and if we don't pick up communications in a minute or so, we'll take the circuit down and standby to come up again when there are further conversations.

CAPCOM Apollo 8, Houston. You take your tape recorder to stop and we'll reset it then and give it back to you.

SC Roger, it's stop.
CAPCOM Thank you.

END OF TAPE

PAO This is Apollo Control at 61 hours 41 minutes and at the present time we show 7 hours 17 minutes until our Lunar Orbit Insertion Maneuver. I will pass along to you information on that maneuver as soon as it is available. In the meantime we anticipate things will be quieting down somewhat both here in Mission Control Center and aboard the spacecraft. The flight plan is relatively quiet for the next several hours. It doesn't begin to pick up activity again until about 3 hours prior to the Lunar Orbit Insertion Maneuver at which time the crew will begin checking out the guidance and navigation equipment and running through their systems checks and preparation for that maneuver and here on the ground they will be passing up the information needed to carry out the maneuver and the crew will be checking this against their onboard figures and against the information that is automatically loaded into the computer from the ground. We'll continue to stand by for any communications that should develop as I said we do expect that the ensuing several hours will be quiet. At 61 hours 43 minutes, this is Apollo Control.

END OF TAPE

APOLLO 8 MISSION COMMENTARY, 12/23/68, GET 615800, CST 8:48, 186/1

PAO This is Apollo Control at 61 hours, 58 minutes, and at the present time Apollo 8 is at an altitude of 18 733 nautical miles, traveling at a speed of 4139 feet per second. Since our last report we've had a couple of conversations with the crew in which we've discussed the, some of the methods for working around the fogged windows that the crew has on the spacecraft in order to carry out the planned tasks in lunar orbit, and we'll play those conversations back for you and continue to stand by for live conversations from the spacecraft.

CAP COM Apollo 8, Houston.

SC Go ahead.

CAP COM Okay. We still need to talk about the REV 2 attitudes we're going to use here to work around the fact that you have a fogged center window. Whenever that's convenient, we'd like to go over what you're thoughts are on the subject and make sure we can get our flight plan squared away.

SC My thoughts are to make do with the best with what we have. We are not interested in changing a lot of things right now.

CAP COM Okay. The one proposal that sounds like it has some advantage to it. If we let Jim do his evaluation through the telescope, you do everything exactly the same except you turn and roll over 180 degrees so that your head's up, and let Jim do his tracking through the telescope and you'll still be all right when you go to pick up your TV and that type of thing. And it looks like that probably will cover everything. We can do that or we can just go as is and just have to let some of that tracking evaluation go by. Another alternate would be to have Jim look out the right-hand rendezvous window, and you may have to change your attitude in order to get the same picture there also.

SC I think we'll try to do that, but I don't - this is one of the things that we'll work out when we get there.

CAP COM Okay. The reason we were looking into it in the flight plan is, if you do want to try rolling over and flying heads up or something of that nature, we can help Bill get a little more out of his photography by giving him some new film settings and that type of thing. We'll have something like that available in case you do fly heads up, why we'll have some numbers we can call up for film fittings.

SC Houston, Apollo 8.

CAP COM Go ahead.

SC Roger. We are going to have to dump some urine, here shortly. Will this bother your tracking?

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CAP COM Apollo 8, we're checking on that with the tracking people now.

SC Houston, just give us the time when we can start on it and we'll hold off until you say so.

CAP COM Okay. And you can anticipate hand over between stations here on the hour. And you might get a slight blitz as we go through. I'll give you a call when we get back.

SC Thank you, Ken. What station are we going to be going to, Ken?

CAP COM Four. Okay, we'll be going to Honey-suckle.

SC Thank you.

CAP COM Now, Apollo 8, Houston. You're cleared for a dump at this time and I understand this is the last gas station for a long time.

SC You mean you don't want us to dump after this for a while?

CAP COM That's affirm. Due to the tracking as you approach the LOI, they would like to minimize any of these type of protovations.

END OF TAPE

GET 62:25.00

APOLLO 8 MISSION COMMENTARY, 12/23/68, CST:9:15 pm

187/1

PAO This is Apollo Control at 62 hours 24 minutes and at the present time Apollo 8 is traveling at a speed of 4,159 feet per second or presently at an altitude of 17,657 nautical miles above the Moon. We have some preliminary information on the Lunar Orbit Insertion Maneuver. We anticipate that this information will be refined and updated as we get additional tracking information on the spacecraft. At the present time we anticipate that the maneuver will be performed at about 69 hours 8 minutes ground elapse time and the burn will be a total duration of about 4 minutes 2 seconds and it will slow the spacecraft about 2,990 feet per second. We anticipate that the velocity at the beginning of the burn will be about 8,400 feet per second. This will give us a velocity following the maneuver of about 5400 feet per second. We have had some conversations with the spacecraft since our last report. We are in communication with the crew at the present time. We'll pick up with the tape and follow with whatever live communications are going on when we complete playing back the tapes.

CAPCOM Apollo 8, Houston, through Honeysuckle.

SPACECRAFT Roger, Houston, through Honeysuckle, we read you loud and clear.

CAPCOM Okay, good morning.

SPACECRAFT Good morning

CAPCOM Thought you went to sleep.

SPACECRAFT You got over Australia pretty fast.

CAPCOM Right. Did that gas station call wake you up?

SPACECRAFT Man, I've been all eyeballs and elbows here for the last several hours.

CAPCOM I'll bet. If you've got nothing else to do, I do have two charts in your LOI table I need to give you some update numbers on.

SPACECRAFT Standby. We'll get our LOI tables man on the line here. Okay, Houston, ...

CAPCOM Yes sir, I've got a couple of charts in your chart book under LOI and I have some numbers to fill in. One of them being the chart of LOI Delta V magnitude versus abort Delta V.

SPACECRAFT Okay, standby and I'll get it out.

CAPCOM Roger.

SPACECRAFT I have the chart out. Go ahead.

CAPCOM All right. Mode 1 5 hours. Roll 1.38 pitch 7.8 niner, yaw 357.37. Mode 1 15 minutes, roll 180.73 pitch 2 niner 46, yaw 1.65 over.

SPACECRAFT Roger, the new attitudes for the Mode 1 5 hour Mode 15 minute are as follows: Roll 1.38, pitch 7.89, yaw 357.37. Mode 1 15 minute, roll 180.73 pitch 29.46 yaw 1.65

CAPCOM Okay, that is correct. Now I also have to give you a couple of points to plot on that curve.

CAPCOM The present curve you have drawn is based on a 60 mile perigee or parallel and you right now have a 62 mile pericynthium and the reason that your target is for 62 miles is to pass over the landing site so I have 5 sets of coordinates for you to copy.

SPACECRAFT Is this to go on the same chart to redraw the curve?

CAPCOM That is affirmative.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, we'll go in on the LOI Delta V Magnitude 1600 abort Delta V 2450.

SPACECRAFT Okay, LOI Delta V Magnitude 1500 Abort Delta V 2450 standby just one. I have it continue

CAPCOM Okay, the next one is the LOI Delta V 2,000 Abort Delta V 3130.

SPACECRAFT Roger, I've got that plotted.

CAPCOM 2400 LOI Delta V, Abort Delta V 3880

SPACECRAFT I've got it plotted.

CAPCOM 2800 LOI Abort Delta V 4700 over.

SPACECRAFT Roger, I have that one plotted too.

CAPCOM All right the last one is LOI Delta V 2990 abort Delta V 5114 that is almost directly into the present curve 5114.

SPACECRAFT Say again the LOI Delta V Magnitude please.

CAPCOM LOI Delta V 2 niner niner 0

SPACECRAFT Roger, 2 and ends in 0. Okay, I have it plotted.

CAPCOM All right and on the next one you should have a chart that number 10 and we have 3 numbers to go in there for a Mode 3 Gimbal angle.

SPACECRAFT Roger, go ahead with the Mode 3 gimbal angle

CAPCOM Roll 180.87 pitch 42.31 yaw 1.65

SPACECRAFT Mode 3 Gimbal Angle are as follows:
Roll 180.87, pitch 42.31, yaw 1.65.

CAPCOM Roger, that is correct.

SPACECRAFT Could you please send up a fetched curve for me?

CAPCOM Roger.

SPACECRAFT Send up a couple.

CAPCOM The only one I have is about 6 foot.

SPACECRAFT Houston, could you give us some Gimbal Angles to point at the Moon. I never have seen it the whole trip and I'm wondering which way it is from us now.

CAPCOM Rog, 180

SPACECRAFT Houston, Apollo 8, radio check.

CAPCOM Rog. Loud and clear.

SPACECRAFT Roger

CAPCOM We are getting ready to give you a run down your systems. We're going over all the final steps

CAPCOM and we will tell you what we see in the way of trajectory and systems information and once again Dr. Joe Kerwin has brought over all the latest news and we can read that up to you a little bit at a time if you don't go to sleep.

SPACECRAFT What's he going to do. Read out of the AMA Journal? Go ahead, we are all ears.

CAPCOM Okay, Here is one. The previously scheduled cease fire by the Viet Cong went into effect today 17 hours before the allied truce was to begin.

SPACECRAFT You lost us on the numbers there. What was that again?

CAPCOM The jest of it was that the VC went into a cease fire earlier than the truce that we had planned on. As a Christmas Holiday type.

SPACECRAFT Roger, good.

SPACECRAFT Houston, Apollo 8.

CAPCOM Roger, Loud and clear, sorry to have stopped on you there. We are going over the summary of the systems data.

CAPCOM Apollo 8, Houston.

SPACECRAFT Go ahead Houston, Apollo 8.

CAPCOM Okay, I have a rundown on your systems here. GMC step

END OF TAPE

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CAP COM down on your systems here. A IMC status of, everything looks real - Go ahead.

SC Just a minute. I want to wait until the LMP gets on the head set, Houston.

CAP COM All right.

CAP COM That's looking pretty good. It looks like we got all the things back in that we took out and we're running right along the prediction. We would like to get a battery C voltage from you if you can just reach over there and touch it.

SC Roger. 37 volts on battery C.

CAP COM Rog. 37 volts. Okay. The predicted trial quantities except on oxygen tank one, 170, oxygen tank two, 170, hydrogen one, 9.5, and hydrogen two, 10.0. You sent me a single trial capabilities, all the way at full power now.

SC Fine.

CAP COM The secondary cooler loop really looked good. Looks like you had a nice tight radiator and everything else on there was working right along the performance curves. Your main oxygen regulators fulfilled at 104 psi during our check. Looking at the lunar orbit expect to be doing a water boil of about 1 pound per hour, and this is just an approximation, has quite a variety of estimates as to what the water boiling requirements may be. Might go anywhere from boiling lots to not boiling at all. The next water dump will be coming up after TEI so you don't have to worry about any of that until you get through. Communications predictions looking good. Possibly a little bit better than what we had hoped for and looks like we're going to get high bit rate on OMNIS. We're 210 foot dish at Goldstone and so be looking for us on the first couple of REV's and we'll be switching sights so we'll go back to using OMNIS for a little bit. The voice quality of PSE is good. Your fuel cells have been running above nominal for the entire flight and they really look nice and stable. There's been some deep stratification -

SC Everything's on normal voice, doesn't it?

CAP COM Okay. Looks like may not be able to have the normal voice. On the cyro tanks, we've had quite a bit of destratification between the oxygen and you know this during the fan cycles and delta V, so we're going to be sure and we're going to remind you again to stir up the oxygen prior to LOI. CMC is running along like clockwork. CMC tells us that the RCS quantities are looking good. You're using the same amount as predicted for your PTC and for your alignment. So we have the way of the redline, we're going to tell you that you can use 30 percent per quad in lunar orbit. Now this is quite a bit fuel to play with, and you can take 30 percent and subtract that from what you have to completion

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of LOI, and that will be a good number. On the SCS, the oxidizer and fuel feed line temperatures are 75 and holding steady. The service module RCS quad package stamps are cycling and holding between 120 and 140 and looks like we're getting normal heating operations. We plan to have you in a 60 mile circular orbit after LOI 2. And we should have some paths for you on the LOI burn at about 67 hours.

SC Roger. We got all that.

CAP COM Okay. We're still going through the tracking and as you know we're going to hold down on the water dumps so forth during the last couple of hours in and out sort of aid the tracking procedures. Everything's running along the line normally now. Do you have any other specific questions? We are looking for an angle on the moon. I guess that about summarizes the system. Everything looks GO right now.

SC Okay, Ken, thank you. We just completed Day 3, meal C and now are going to break up and each take a rest period before LOI.

CAP COM Okay, real fine. Everybody wanted to ask you if wouldn't try and get some sack time here before we go in. It's going to be a big day.

SC Roger.

END OF TAPE

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SC Okay, Houston, go ahead while E com is
on the line.

CAPCOM Okay, we're just start with E com business
then. I give you a summary of your batteries, battery A we
calculate 38.3 amp-hours, battery B -

SC Stand by for a second, Ken. Let me get
the chart out.

CAPCOM Roger.

SC Go ahead now.

CAPCOM Okay, battery A is 38.3, battery B is 36.9,
battery C 38.5. That's looking pretty good. Looks like we've
got all the things back in that we took and whipping right
along.

END OF TAPE